CLAIMS:

1. A surfactant-enhanced atomization process comprising:
   a) mixing an effective amount of at least one surfactant with an atomization fluid to form a first mixture;
   b) injecting said first mixture into a fluidized catalytic cracking feedstream to form a second mixture; and
   c) conducting said second mixture through a feed nozzle.

2. The process according to claim 1 wherein said effective amount of surfactant is that amount of surfactant capable of reducing the static and dynamic interfacial tension between the fluidized catalytic cracking feedstream and atomizing fluid.

3. The process according to claim 1 wherein said effective amount of surfactant is about 25 to about 50,000 wppm, based on the atomization fluid.

4. The process according to claim 2 wherein said at least one surfactant is selected from those surfactants which, under fluidized catalytic cracking feed preheating do not decompose, but will decompose under the effective cracking conditions.

5. The process according to claim 2 wherein said at least one surfactant is selected from non-ionic surfactants and mixtures thereof having hydrophilic lipophilic balance values ("HLBs") in the range of about 3 to about 20.

6. The process according to claim 2 wherein said at least one surfactant is selected from alkyl alkoxylates.

7. The process according to claim 1 wherein said atomizing fluid is selected from subcooled water (water having a temperature above its normal atmospheric pressure boiling point at pressure sufficient to maintain it in a liquid state), steam, light hydrocarbon gas (C_4-), inert gases and combinations thereof.

8. The process according to claim 5 wherein the atomizing fluid is steam.

9. The process according to claim 1 wherein said process further comprises:

a) conducting said second mixture through a feed nozzle into a fluidized catalytic cracking reaction zone, thereby producing droplets of the second mixture and injecting them into a reaction zone; and

b) contacting the droplets of the second mixture with a fluidized catalytic cracking catalyst under effective catalytic cracking conditions in the reaction zone thereby producing at least an FCC product stream comprising at least C_2- dry gas and spent catalyst comprising strippable hydrocarbons.

10. The process according to claim 9 wherein an effective amount of said at least one surfactant is that amount sufficient to reduce the static and dynamic interfacial tension of the fluidized catalytic cracking feedstream and atomizing fluid such that droplets of the second mixture formed by conducting the second mixture through said feed nozzle have a mean droplet diameter less than about 1000 μ.

11. The process according to claim 9 wherein said effective cracking conditions include: (i) temperatures from about 500°C to about 650°C, (ii) hydrocarbon partial pressures from about 10 to 40 psia (70-280 kPa); and, (iii) a catalyst to feed (wt/wt) ratio from about 1:1 to 12:1, where the catalyst weight is based on the total weight of the catalyst composite.

12. The process according to claim 10 wherein said effective amount of surfactant is that amount sufficient to reduce the amount of C_{2-} dry gas in the FCC product stream.

13. The process according to claim 10 wherein said process further comprises fractionating said FCC product stream to produce at least a naphtha boiling range product stream.

14. The process according to claim 1 wherein said fluidized catalytic cracking feedstream is selected from gas oils, heavy hydrocarbon oils comprising materials boiling above 1050°F (565°C); heavy and reduced petroleum crude oil; petroleum atmospheric distillation bottoms; petroleum vacuum distillation bottoms; pitch, asphalt, bitumen, other heavy hydrocarbon residues; tar sand oils; shale oil; liquid products derived from coal liquefaction processes; and mixtures thereof.

15. The process according to claim 1 wherein said effective amount of surfactant is that amount effective at reducing the static and dynamic interfacial tension between the FCC feedstream and atomizing fluid by at least 50%.

16. The process according to claim 13 wherein said effective amount of surfactant is that amount of surfactant sufficient to reduce the amount of C_2- dry gas in the FCC product stream.

17. The process according to claim 16 wherein said effective amount of surfactant is that amount of surfactant sufficient to reduce the amount of C_2- dry gas in the FCC product stream without causing foaming in the FCC process unit.

18. The process according to claim 16 wherein said effective amount of surfactant is that amount of surfactant sufficient to reduce the amount of C_2- dry gas in the FCC product stream without causing foaming, haze, or increasing the oxygenate content of said naphtha boiling range product stream.

19. A surfactant-enhanced fluid catalytic cracking process comprising:

a) mixing an effective amount of a surfactant with an atomization fluid selected from subcooled water (water having a temperature above its normal atmospheric pressure boiling point at pressure sufficient to maintain it in a liquid state), steam, light hydrocarbon gas (C_4-), inert gases and/or combinations thereof to form a first mixture;

b) injecting said first mixture into a fluidized catalytic cracking feedstream to form a second mixture;

c) conducting said second mixture through a feed nozzle into a fluidized catalytic cracking reaction zone, thereby producing droplets of the second mixture and injecting them into a reaction zone; and

d) contacting the droplets of the second mixture with a FCC catalyst under effective catalytic cracking conditions in the reaction zone

thereby producing at least an FCC product stream comprising at least C_{2-} dry gas and spent catalyst comprising strippable hydrocarbons;

wherein said effective amount of surfactant is that amount of surfactant capable of reducing the static and dynamic interfacial tension between the fluidized catalytic cracking feedstream and the atomizing fluid.

20. The process according to claim 19 wherein said effective amount of surfactant is about 25 to about 50,000 wppm, based on the atomization fluid.

21. The process according to claim 20 wherein said at least one surfactant is selected from those surfactants known which, under fluidized catalytic cracking feed preheating do not decompose, but will decompose under the effective cracking conditions.

22. The process according to claim 20 wherein said at least one surfactant is selected from non-ionic surfactants and mixtures thereof having hydrophilic lipophilic balance values in the range of about 3 to about 20.

23. The process according to claim 22 wherein said at least one surfactant is selected from alkyl alkoxylates, preferably alkyl ethoxylates, mixtures of aldehydes and ketones, preferably alkyl aldehyde acids and ketones, more preferably alkyl aromatic aldehydes and ketones and acids.

24. The process according to claim 19 wherein the atomizing fluid is steam.

25. The process according to claim 24 wherein an effective amount of said at least one surfactant is that amount sufficient to reduce the static and dynamic

interfacial tension of the fluidized catalytic cracking feedstream and atomizing fluid such that droplets of the second mixture formed by conducting the second mixture through said feed nozzle have a mean droplet diameter less than about 1000 μ.

26. The process according to claim 19 wherein said effective cracking conditions include: (i) temperatures from about 500°C to about 650°C, (ii) hydrocarbon partial pressures from about 10 to 40 psia (70-280 kPa); and, (iii) a catalyst to feed (wt/wt) ratio from about 1:1 to 12:1, where the catalyst weight is based on the total weight of the catalyst composite.

27. The process according to claim 24 wherein said effective amount of surfactant is that amount sufficient to reduce the amount of C_2- dry gas in the FCC product stream.

28. The process according to claim 19 wherein said process further comprises fractionating said FCC product stream to produce at least a naphtha boiling range product stream.

29. The process according to claim 19 wherein said fluidized catalytic cracking feedstream is selected from gas oils, heavy hydrocarbon oils comprising materials boiling above 1050°F (565°C); heavy and reduced petroleum crude oil; petroleum atmospheric distillation bottoms; petroleum vacuum distillation bottoms; pitch, asphalt, bitumen, other heavy hydrocarbon residues; tar sand oils; shale oil; liquid products derived from coal liquefaction processes; and mixtures thereof.

30. The process according to claim 28 wherein said effective amount of surfactant is that amount of surfactant sufficient to reduce the amount of C_{2-} dry gas in the FCC product stream without causing foaming in the FCC process unit.

31. The process according to claim 28 wherein said effective amount of surfactant is that amount of surfactant sufficient to reduce the amount of C_{2-} dry gas in the FCC product stream without causing foaming, haze, or increasing the oxygenate content of said naphtha boiling range product stream.